



TITLE STRAIN GAGE AMPLIFIER, TRANSISTORIZED 1033932		LOCKHEED AIRCRAFT CORPORATION MISSILE SYSTEMS DIVISION		TEST PROCEDURE ACCEPTANCE MO34349 SHEET 1 OF 7 SHEETS	
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REVISIONS

SYM	DATE	DESCRIPTION	FOR TEST	FOR DESIGN

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Vendor: LMSD Fabricated

References: ATS 1034349
LMSD 1033934
LMSD 1033987
ATP MO33988**1.0 INSPECTION CHARACTERISTICS**

- 1.1 Input Impedance
- 1.2 Gain
- 1.3 Phase Shift
- 1.4 Common Mode Gain

2.0 TEST EQUIPMENT

The following types of test equipment or their equivalents are recommended for the performance of the tests required in this test procedure.

- 2.1 R & D Strain Gage Oscillator Test Panel 31-066A
- 2.2 Telemeter Sub-Assembly Test Station 31-050
- 2.3 Telemeter Electronic Unit Test Panel 31-014
- 2.4 R & D Balanced Strain Gage Bridge Simulator 31-063
- 2.5 R & D Phasing Network
- 2.6 High gain Dual Loop Oscillator LMSD 1034099
- 2.7 Isolation Amplifier - Keithley Model 102-B
- 2.8 RDB Channel Filter - Hycor 5801
- 2.9 D.C. VTVM - Hewlett-Packard 410B
- 2.10 Shielded Interconnecting cables.

If required for the vibration test, the following additional equipment is suggested or that which may be recommended by the responsible environmental laboratory test group.
- 2.11 Shaker, Calidyne Model A-174, including Control and Power Packs console, Calidyne Model 6800.
- 2.12 Vibration Holding Fixture
- 2.13 R & D Vibration Monitor Console

This assembly consists of the following items:



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- 1 ea Oscilloscope, Tektronix Type 531
- 1 ea Dual Pre-amplifier, Tektronix Type 53/54B
- 1 ea Frequency Counter, Berkeley Model 554
- 1 ea Sub-Carrier Discriminator
- 1 ea Regulated Power Supply, Dressen-Barnes Model D3-300D
- 1 ea D.C. Decade Amplifier Kay-Lab Model 103R
- 1 ea R & D Adapter Panel
- 1 ea 6.3 VDC Power Supply, P.R. Mallory Model 12R56D
- 1 ea Digital Voltmeter, NLS Model 451

2.14 Recording Oscillograph, Consolidated Electrodynamics Corp. Type 5-119

2.15 A.C. VTVM, Ballantine Labs. Model 320

2.16 Frequency Meter, Hewlett-Packard 500B

2.17 Amplifier, McIntosh Model MI-60

2.18 Demagnetizer, Alternating Current, Kendrick & Davis No. 202

2.19 Decade Potentiometer, Electro-Measurements Model DB-265



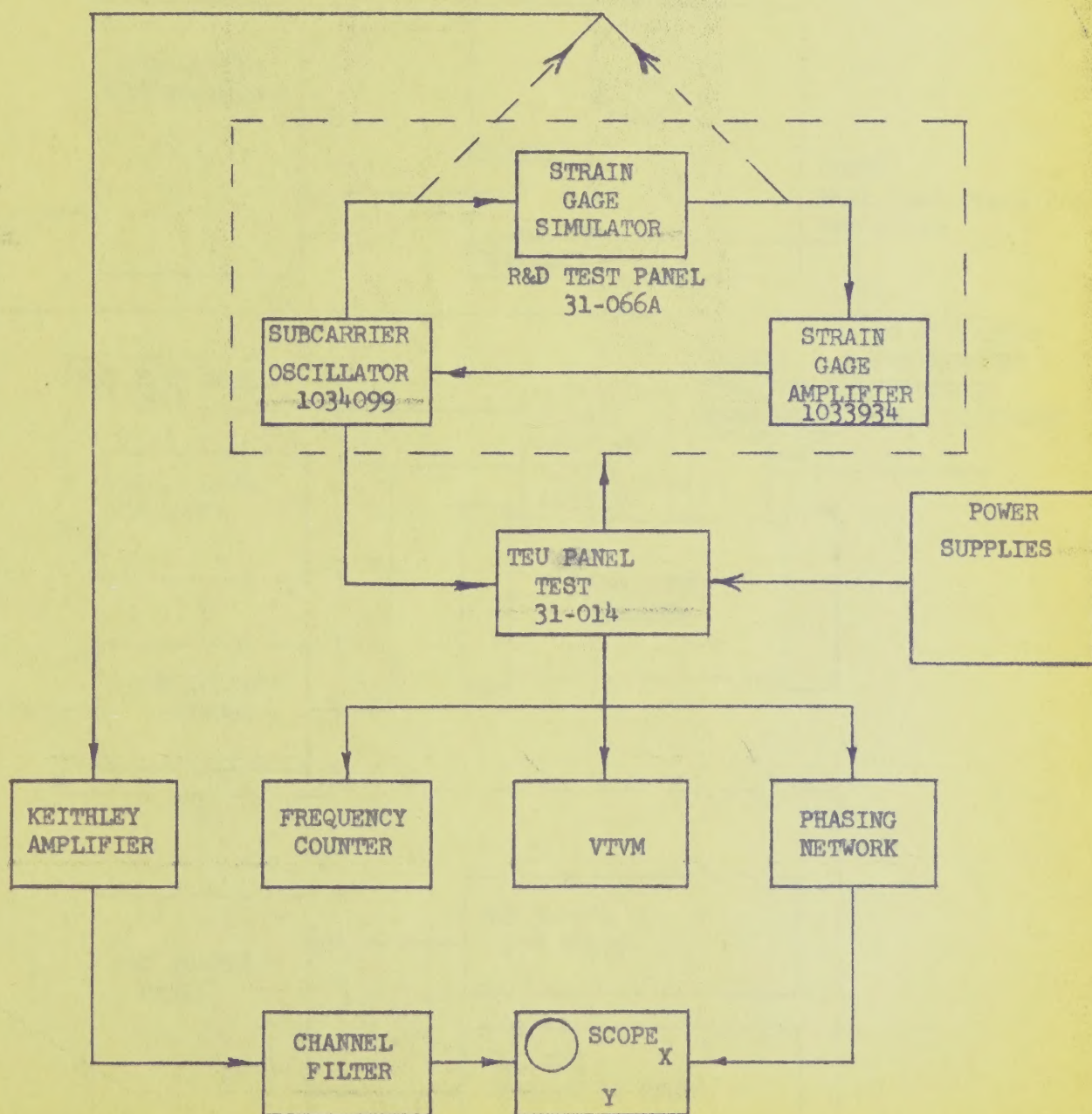
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3.0 TEST DIAGRAM

3.1 Test setup for the Strain Gage Amplifier 1033934 standard conditions.





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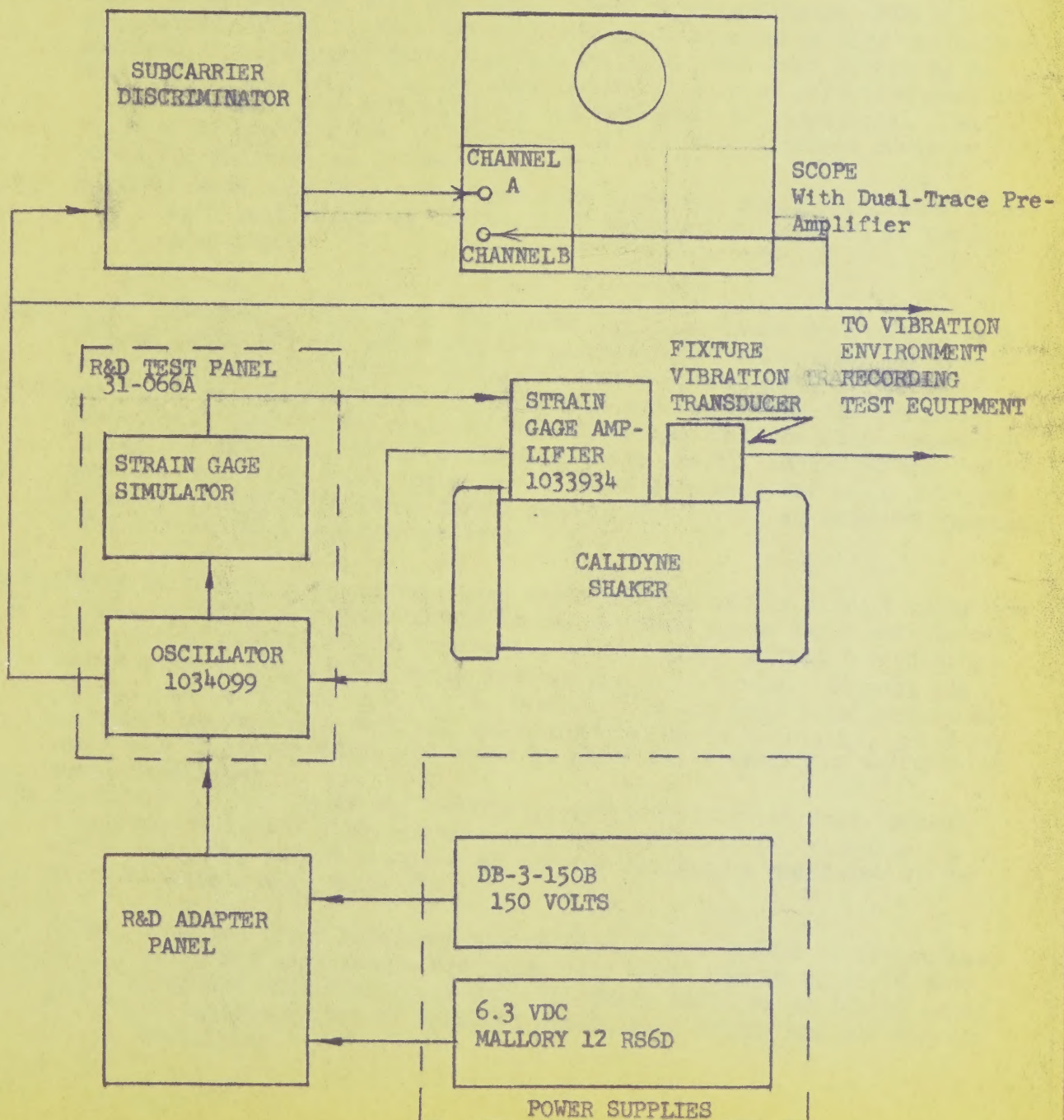
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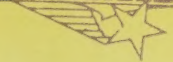
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3.2 Vibration test setup for Strain Gage Amplifier 1033934



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4.0 TEST PROCEDURE

- 4.1 Bias - With the dual loop oscillator out of the circuit, connect the D.C. VTVM to the emitter of transistor Q2. Set the B $\nearrow$ voltage at P1-D to 6.8 V. Adjust the value of resistor R₂ for a reading of 2.45 volts D.C. at the emitter of Q2.
- 4.2 Gain - Plug into the test equipment a dual loop oscillator LMSD 1034099 for channel 13 that has been set up in accordance with the method outlined in Acceptance Test Procedure M033988. With test switch S₆ in center position, adjust R₆ for full channel frequency deviation when switch S₂ is thrown to the calibrate ($\nearrow$) and calibrate (-) positions. The value of R₆ shall be 450 to 550 ohms. If not within proper resistor limits check for malfunction in the amplifier.
- 4.2.1 Common Mode Gain - The frequency deviation shall not exceed 15 cps with test switch S₇ in the CAL 0 position and with S₃ in the 1 or 3 position.
- 4.3 Input Impedance - With S₆ in the center position throw test switch S₂ to the calibrate ($\nearrow$) and calibrate (-) positions and write down the frequency deviation. With S₆ in the 500 ohms position throw S₂ to the calibrate ($\nearrow$) and calibrate (-) positions and write down the frequency deviation. Compute the ratio of deviations and find the input impedance using the frequency versus deviations ratio chart. Adjust R₈ and repeat the test until the input impedance is 600 $\pm$ 20 ohms. The value of input impedance obtained is for a strain gage bridge having an inherent impedance of 350 ohms and a gage factor of 2.
- 4.4 Phase Shift - With the strain gage amplifier out of the circuit apply the output of the strain gage bridge to the vertical scope input and through the phasing network to the horizontal scope input. Adjust the phasing network for a 90° phasing angle indication on the scope. Connect the strain gage amplifier back in the test circuit and with equal magnitude voltages to the scope vertical and horizontal input terminals, check for any change in phase shift. If there is phase shift check for malfunction in the amplifier.
- 4.5 Amplitude Shift - Check the oscillator output voltage at full channel frequency deviation with calibrate ($\nearrow$) and calibrate (-) circuits activated. The output voltages at the two deviations shall not differ from each other more than 5%.

NOTE: Gain and input impedance are related. They should be re-checked after any adjustments are made. All final checks shall be made with the amplifier cover on. All tests shall be performed using a complete system of balanced strain gage bridge and sub-carrier oscillator.

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Note: Where the shop order calls for a vibration test to be performed on the amplifier, the unit shall be subjected to vibration in accordance with paragraph 4.6. If the unit has previously been exposed to stray magnetic fields such as the shaker field, the amplifier shall be degaussed before vibration tests are performed.

- 4.6 Vibration - Attach the unit to the vibration fixture and connect to the test equipment. Subject the unit to vibration applied along the X, Y and Z axis, at a G level of from 5 to 6 G, and at a sweep frequency of from 20 to 2000 cps, the frequency spectrum being traversed automatically in from 2 to 3 minutes. The resultant deviation in oscillator frequency from the center frequency shall not exceed 5% of bandwidth when the amplifier is subjected to the vibration.

5.0 NOTES

- 5.1 For the vibration tests, the amplifier shall be orientated as in the figure below.

